

## CONTRIBUTIONS TO THE ICHTHYOLOGY OF SIAM.

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## IX. SIAMESE CLARIID CATFISHES.

The catfishes of the family Clariidae, genus *Clarias*, are among the most abundant, most widely distributed, and most important economically of the fresh-water fishes of Siam. Under the name *pla duk* (wriggling fish), with or without qualifying adjectives, these fishes are known throughout the country, are highly esteemed as food, are extensively eaten in the households of fishermen and farmers, and are regularly offered for sale in the markets of Bangkok and other towns. Fish taken to market are exposed for sale alive in shallow tubs with little or no water or on stone slabs like *Anabas* and *Ophicephalus*; and if not sold one day are taken back the next.

Four species of *Clarias* are definitely known from Siam, and two additional species are of doubtful status. On all of these some notes are herewith presented, preceded by a simple key by which the species may be identified.

*Key to the species of clariid catfishes ascribed to Siam.*

- A. Dorsal and anal fins confluent with caudal fin.....*nienhofti*
- B. Dorsal and anal fins not confluent with caudal fin
  - a. Pectoral spine with strong, sharp, vertical denticulations on its anterior margin.....*dussumieri*
  - aa. Pectoral spine without strong vertical denticulations on its anterior margin, the surface smooth, rough, or inconspicuously denticulated
    - b. Occipital process more or less angular, with round tip, its width about twice its length in medium sized fish
      - c. Distance from tip of occipital process to dorsal fin contained 4.5 to 5.5 times in length of head measured along upper median line.....*batrachus*
      - cc. Distance from tip of occipital process to dorsal fin contained 2.5 times in length of head measured along upper median line.....*teysmanni*
    - bb. Occipital process low, broadly curved, its width 3 to 5 times its length
      - d. Distance from occipital process to dorsal fin contained 2.5 times in length of head measured along upper median line; gill-rakers 13.....*leiacanthus*
      - dd. Distance from occipital process to dorsal fin contained 5 to 7 times in length of head measured along upper median line; gill-rakers over 20.....*macrocephalus*

Zoologically the clariids are interesting because of a greatly enlarged branchial cavity containing, in addition to gills, arborescent

organs which enable the fish to breathe atmospheric air. The gills are relatively small and appear inadequate to sustain life. Fish in a tank which are prevented from reaching the surface at frequent intervals soon die, as shown in experiments conducted by the Department of Fisheries in Bangkok.

1. *Clarias nieuhofi* Cuvier & Valenciennes. *Nieuhof's Clarias*.

This species, known from Sumatra, Java, Borneo, and other islands of the Indo-Australian Archipelago, from the Philippines, and from Malacca, is rare in Siam and is as yet recorded only from the southeastern district. It may at once be identified by the union of the dorsal and anal fins with the caudal. A specimen 37 cm. long taken at Nong Khor on November 9, 1926, had the back marked by 13 transverse rows of white spots equal to or larger than eye, the side with an irregular longitudinal band of larger white spots, and the lower part of the body except the belly similarly spotted. The maxillary and mandibular barbels are longer than given by Bleeker and Weber & de Beaufort.<sup>1</sup> A specimen from Hoopbon, taken November 5, 1931, was 36 cm. long and had all the barbels greatly reduced in length as by an accident. At Nong Khor the fish is said to get considerably larger than the specimen taken. The maximum length for the Dutch East Indies seems to be about half a meter. The local name at Nong Khor and Hoopbon is *pla duk lampan*. The only other specimen, 13 cm. long, came from the Krat River near Kao Seming, in December, 1933.

2. *Clarias dussumieri* Cuvier & Valenciennes. *Dussumier's Clarias*.

This appears to be the proper specific name for the fish later called *meladerma* (1846) and *melanoderma* (1859) by Bleeker and listed under the latter form by Weber & de Beaufort.<sup>1</sup> The species is easily recognized by its uniformly black color and by the strong, prominent teeth on the anterior aspect of the pectoral spine. Although ascribed to Siam by Weber & de Beaufort (possibly on the

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<sup>1</sup> Fishes of Indo-Australian Archipelago, II, 1913.



authority of Karoli, whose determinations and localities are sometimes questionable), no specimens have been obtained in the extensive collecting done by the Siamese Department of Fisheries. It should be mentioned, however, that Tirant<sup>1</sup> listed *C. dussumieri* from Hué (Annam) and that Chevey<sup>2</sup> assigns both *C. dussumieri* and *C. melanoderma* to Indo-China.

3. ***Clarias batrachus*** (Linnaeus). *Toad Clarias.*

Under the name of *pla duk dan* (dan=dull colored) the Siamese recognize the commonest of the fishes of this genus. There is a widespread belief that this is the male of the same species of which the female is designated *pla duk uey*. The fish has a very wide distribution in Siamese rivers, canals, lakes, and swamps, and occurs also in Ceylon, India, Burma, Malaya, East Indies, and Philippines. It is a food fish of great local importance, although the flesh, which is white, is locally regarded as not so rich or nourishing as that of the other common species (*C. macrocephalus*).

This fish, like other members of the genus, suffers no inconvenience when kept out of water for long periods of time, and sometimes voluntarily leaves the water, presumably in search of better feeding or living conditions. Movements on land are like swimming and can be described as wriggling: the pectoral fins and flat head assist in keeping the fish in an upright position, and progress is accomplished by rapid lateral bendings of the tail. On August 13, 1926, Mr. D. Burke-Borrows, of the Siamese Forest Department, brought to me a fish 25 cm. long that in the late afternoon of August 12 was taken on a metalled driveway in his yard in Bangkok. The fish had left a klong fifteen meters away and was proceeding leisurely toward another klong thirty-five meters away. Placed in a flat jar of water in my office, the fish left the jar during the night (apparently leaping out), dropped from a table to the floor, went through a passage-way, large exhibit room, and front hall, and was just inside the front door when I arrived at 11 o'clock p. m. The fish was

<sup>1</sup> Memoire sur les poissons de la riviere de Hué, 1883.

<sup>2</sup> Inventaire de la faune ichtyologique de l'Indochine, 1932.

released in a klong the next day.

The shape of the occipital process in this species varies somewhat with the size of the fish. In specimens up to 15 or 18 cm. long the sides of the process form an angle of  $70^{\circ}$ , while in specimens 25 to 30 cm. long the angle may be  $90^{\circ}$ .

The collection of the Department of Fisheries contains specimens of *C. batrachus* from the following waters: Menam Chao Phya at Bangkok, Ayuthia, Ban Poh, Paknampo; Meping at Raheng, Chomtong, and Chiangmai; Kwan Payao; Menam Bangpakong at Prachin; Rangsit Canal near Menam Sak; Meklong at Rajburi; Pattani River; small stream on Koh Chang; Mekok at Chiangmai; and Seamreap River, Cambodia.

4. *Clarias teysmanni* Bleeker. *Teysmann's Clarias*.

Known from Java, Sumatra, Borneo, Ceylon, and Malaya, this species is very rare in Siam, and, as a matter of fact, has as yet been found only in mountain streams in Nakon Sritamarat, Peninsular Siam. The collection of the Siamese Department of Fisheries contains a specimen 18 cm. long obtained in February, 1922, referred to in Hora's report (Journal of the Natural History Society of Siam, Vol. VI, No. 2, 1923), and two others, 11 and 15 cm. long, taken by the present writer in Klong Pong at Ban Huey Ta, near the base of Kao Luang, on July 12, 1928. The local name of the fish is *pla mod*. The fish reaches a length of about 20 cm., is similar to *C. nieuhoi* in coloration, and is chiefly distinguishable by the relatively wide space between the dorsal fin and the occipital process.

5. *Clarias leiacanthus* Bleeker. *Smooth-spined Clarias*.

Bleeker credited this species to Siam in two papers published in 1865, the record being based on specimen or specimens in a collection of fishes in the Musée du Jardin des Plantes in Paris obtained in Siam by Mons. Bocourt. This species has not since been met with in Siam. The fish has either escaped notice in the extensive collecting done in Siam in recent years or Bleeker made a misidentification. In the latter contingency the species which Bleeker had before him was probably what Günther had in the meantime



described as *C. macrocephalus*. In Bleeker's paper, Sixième Notice sur la Faune Ichthyologique de Siam (1865), which contains an "enumeration of all the species actually known from Siam", there is no mention of *C. macrocephalus*, described and recorded from Siam in 1864. The definitely ascertained habitat of *C. leiacanthus* embraces only the islands of Sumatra, Banka, Nias, and Borneo.

6. *Clarias macrocephalus* Günther. *Large-headed Clarias.*

This species was described from Siam in 1864 from specimens in the British Museum obtained in the Jamrach purchase. The description is imperfect in some respects but seems sufficiently complete to permit the recognition of the species and its differentiation from *C. leiacanthus*, its nearest ally. It is true that Weber and de Beaufort<sup>1</sup> regarded *C. macrocephalus* as "a rather doubtful species" but apparently they had seen no specimens from Siam. The species is not known to occur in the Dutch East Indies, and although Weber reported it from Sumatra in 1894, his specimens were subsequently regarded as *C. batrachus*. In addition to the types, the British Museum has a specimen collected at Bangkok by Capt. Stanley Flower, and the British Museum Catalogue of Fishes lists the species from Upper Tonkin and the Philippines. Karoli recorded the fish from Siam in 1882 and Sauvage from the Menam Chao Phya in 1883. Chevey did not give the species a place in his catalogue;<sup>2</sup> specimens, however, have been collected by me in Cambodia.

*C. macrocephalus* may be readily recognized by its broad, low, evenly-curved occipital process which extends to within a very short distance of the dorsal fin. The shape of the process is similar to that in *C. leiacanthus*. The head, measured from the tip of the occipital process, is long and the name Günther bestowed on the species is justified. In a specimen 31 cm. long from Tale Noi, Peninsular Siam, the length of the head is 7.3 cm. and is contained 3.7 times in the standard length of the fish as against 4 to 5 times in *leiacanthus*; the occipital process is nearly 7 times as wide as

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<sup>1</sup> Fishes of the Indo-Australian Archipelago, II, 1913.

<sup>2</sup> Inventaire de la faune ichthyologique de l'Indochine, 1932.

long; the space between the occipital process and the dorsal fin is contained about 7 times in the length of the head, whereas in *leiakanthus* the space between the process and the dorsal fin is contained 2.5 times in the length of the head. Another feature which may be useful for diagnostic purposes is that whereas *leiakanthus* is reported<sup>1</sup> as having 13 gill-rakers on the long arm of the first branchial arch, in *macrocephalus* the number is 23 to 25.

Dr. Frederik P. Koumans, of the Royal Natural History Museum of Leiden, Holland, kindly examined specimens of *C. macrocephalus* from three localities in Central Siam and compared them with Bleeker's cotypes of *leiakanthus*, finding the species closely allied but showing the differences that have already been indicated together with others, such as size of eye (larger in *macrocephalus*), length of barbels (shorter in *macrocephalus*), and dorsal and anal rays (fewer in *macrocephalus*).

Next to *C. batrachus*, this is the commonest and commercially the most valuable of the Siamese species of *Clarias*. It is called *pla duk uey* (uey=fat), and as a food fish is rated higher than the other species, the flesh being considered richer, more tasty, and more nourishing; and in the retail markets the price is usually somewhat higher. The fish can nearly always be easily distinguished by its color, especially of the under parts which are whitish or pale creamy yellow, while in *batrachus* they are usually grayish blue or purple.

Localities in which this species has been collected for the Siamese Department of Fisheries are: Menam Chao Phya at Bangkok, Ban Pahan, and Paknam; Menam Bangpakong at Prachin; Samrong Canal; Bangkanak Canal; roadside ditches, Chantabun; Klong Tadi, Nakon Sritamarat; Tale Noi; Meklong at Rajburi and west branch (Kwe Noi) of Meklong near Kanburi; and Seamreap River, Cambodia. Waters in Siam from which specimens are lacking are tributaries of the Mekong and Salwin.

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<sup>1</sup> Fishes of the Indo-Australian Archipelago, II, 1913.



X. NOTE ON THE MOUNTAIN CATFISH *OREOGLANIS*.

At the time the original description of *Oreoglanis siamensis* was drawn up, the fish was known only from two specimens taken in the Mekang, a tributary of the Meping, in North Siam. Before the publication<sup>1</sup> of the description, however, there had come into my possession a specimen which subsequently proved to represent the same species, although no reference to it was made in the paper cited.

On December 23, 1932, fishes were collected with a cast net in the Melao, a tributary of the Meleng, which in turn is an affluent of the Meping. The Melao is a clear, cold, swift mountain brook, northwest of Chiangmai, North Siam, and the place where fishing was done is 725 meters above sea level. Among nine or ten species of small fishes there obtained, was a specimen of *Oreoglanis*, caught shortly before dusk, kept alive during the night in a small wicker basket fastened in the stream near my tent, and examined the next morning.

This species appears to be well known to the local mountain people who call it *pla tit hin* (stone-sucking fish), a name given to no other fish. A fish of the same name and description was reported as occurring in other mountain streams in the upper Meping basin and also at various places in the valley of the Mepai, a tributary of the Salwin, but no specimens were obtained.

In life the specimen referred to was almost uniformly olive-green above, fleshy-pink below, with a small creamy-white ovate spot on the back at either side of the base of the dorsal fin.

The respiratory apparatus and movements of mountain-stream fishes show great variety and are always of interest. It may therefore be worth while to record a brief field observation on this particular fish.

The normal resting altitude of the fish was with its adhesive apparatus functioning, even in water that had no current. It attached to any substance: stone, glass, porcelain, wood, basket-work, or

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<sup>1</sup> A New Genus and New Species of Glytosternoid Catfishes. Journal Siam Society, Natural History Supplement, Vol. IX, No. 1, page 70, 1933.

vegetation. The sucking-disc on the lower lip is supplemented by corrugations on the front and sides of the cephalic disc which are very distinct in life but become less prominent in preservative. The respiratory movements of the opercular flaps were rapid but not very marked. As the fish faced the current, the long nasal barbels were fully extended vertically and at their base the nostrils were conspicuous as very elongated triangular openings the apex of which extended nearly half the length of the barbels. There was no evidence of a current of water into the mouth and out of the branchial openings; and it is possible that a feeble current of water to the gills through the restricted branchial openings is induced simply by the movements of the gill flaps.

XI. STATUS OF THE CATFISHES *Mystus tengara* AND  
*Mystus vittatus* IN THE SIAMESE FAUNA.

Catfishes belonging in the genus for many years called *Macrones* (Duméril, 1856) are numerous in Siam. This name, however, had been given in 1841 to a genus of beetles and was therefore unavailable in ichthyology. An earlier name was *Mystus* (Gronow, 1763), and this generic designation may be used, although Jordan (1919), regarding as questionable the eligibility of the names of Gronow, proposed the name *Aoria* for fishes of this group. Species heretofore recorded from Siam, in addition to the two which constitute the basis for this note, are *cavasius*, *gubio*, *micracanthus*, *nemurus*, *nigriceps*, *planiceps*, *wolffi*, and *wycki*. Among the Siamese these fishes are usually called *pla kayeng* (meaning ugly or repulsive fish), with or without qualifying terms.

Bleeker<sup>1</sup>, studying fishes in the Musée du Jardin des Plantes in Paris collected in Siam by Bocourt, found a specimen or specimens of what he called *Hypselobagrus tengara*. The British Museum contains specimens from Siam listed as *Macrones tengara*; and in 1882 Karoli<sup>2</sup> recorded the species from Siam.

<sup>1</sup> Nouvelle Notice sur la Faune Ichthyologique de Siam, 1865.

<sup>2</sup> Prodromus piscium Asiae orientalis.



*Mystus tengara* (Hamilton) according to Day<sup>1</sup> is known from Northern India, the Punjab, and Assam, and is a small species, apparently attaining a length of only 10 cm. Day held the view that the *tengara* of Günther<sup>2</sup> was not the *tengara* of Hamilton but was the *vittatus* of Bloch.

Collections from all parts of Siam made for the Siamese Department of Fisheries have contained no specimens of *tengara*. The writer was therefore prompted to write to Mr. J. R. Norman of the British Museum to verify the existence in that institution of undoubted specimens of *tengara* from Siam. Under date of April 5, 1934, Mr. Norman wrote as follows:

"We have three specimens from Bangkok (Flower) and two larger ones labelled Siam (Prince Chumporn), in the British Museum collection as *Macrones tengara*. I have examined these, and find that they all agree with the description of *M. vittatus* as given by Day. Thus, it appears that the true *tengara* does not occur in Siam."

*Mystus vittatus* is recorded by Day<sup>3</sup> as occurring throughout India, Assam, Burma, and Ceylon, and also in Siam, the assignment of the species to Siam being doubtless based on Bleeker's reference (l. c.). It reaches a length of 20 cm. The species occurs in Siam but is not common and is represented by a few specimens all from the Menam Chao Phya and Menam Bangpakong. One taken by the writer in the Menam Chao Phya at Paknampo, Central Siam, November 18, 1923, was 17.0 cm. long; the local name for the fish in that district is *pla kayeng kang lai*. A drawing of that specimen made by Luang Masya Chitrakarn was sent to the Indian Museum in Calcutta and examined by Dr. S. L. Hora who wrote: "The drawing shows all the salient features of *vittatus* (Bloch), one of our commonest and variable species."

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<sup>1</sup> Fishes of India.

<sup>2</sup> Catalogue of Fishes, British Museum.

<sup>3</sup> Fishes of India.

XII. THE CATFISH *Pseudobagrus nudiceps* AS A SIAMESE FISH.

This species of catfish presents one of the curiosities of ichthyology. It was described as a new species by Sauvage (Bulletin de la Société Philomatique de Paris, 7me series, 1882-1883, p. 155) in a paper entitled "Sur une collection du poissons recueillie dans the Me-Nam (Siam) par M. Harmand". The paper enumerated 70 species, of which *Puntius siamensis*, *Paralauca harmandi*, *Barilius ornatus*, and *Pseudeutropius siamensis*, together with *Pseudobagrus nudiceps*, were indicated as new. Extensive collecting throughout the length of the Menam Chao Phya during a period of twelve years has failed to yield any specimens of this fish. This fact alone would not be extraordinary, as this great river and its connecting streams and canals constitute a vast water area in which an uncommon and non-obtrusive fish might be overlooked for many years; but when taken in connection with other information it strongly suggests that the species has no status in the Siamese fauna.

In the same publication in which Sauvage reported on Siamese fishes collected by Dr. Harmand, in the same volume, and on immediately preceding pages, he had a paper entitled "Sur une collection de poissons recueillie dans le lac Biwako (Japon) par M. F. Steenackers." In this paper he described as new, in language practically identical with that used in describing the fish from the Menam Chao Phya, a fish from Lake Biwa, Japan, which he called *Pseudobagrus nudiceps*. The length assigned to the species in both cases was "0,090", and obviously he was dealing with the same specimen or specimens.

The present writer does not know whether Sauvage ever made the explanation or correction that was manifestly incumbent on him. It may be pointed out, however, that the genus *Pseudobagrus* was erected by Bleeker to accommodate the Japanese freshwater fish called *Bagrus aurantiacus* by Schlegel, that the genus has no known representatives south of China, and that Jordan & Fowler in reviewing the catfishes of Japan suggest that Sauvage's *mudiceps* from Lake Biwa may be identical with Steindachner's *ransonnetii* described from Osaka in 1887.



XIII. SIAMESE CATFISHES OF THE GENUS *PSEUDEUTROPIUS*.

The genus *Pseudeutropius* of Bleeker has numerous members in India, appears to be absent from the Malay Peninsula and French Indo-China, has two species in Sumatra and Borneo, and is represented in Siam by several rare forms, as follows. These fishes have the most exuberant development of "feelers" of any local catfish, there being one nasal, one maxillary, and two mandibular pairs all of which in the commonest species are longer than the head.

Sauvage, in 1883, reporting<sup>1</sup> on fishes collected in the Menam Chao Phya by Dr. Harmand, described apparently from a single specimen 13.5 cm. long a new species which he called *Pseudeutropius siamensis*. The description is incomplete but seems to validate a species characterized essentially by vomero-palatine teeth in four distinct patches, by nasal barbels which extend nearly to the termination of the anal fin, and by 48 rays in the anal fin. The length of the nasal barbels exceeds that in any other species. Collecting done for the Department of Fisheries has failed to yield any specimens that could unhesitatingly be referred to this species but has produced a number of specimens that will be referred to later.

A common Indian and Burman species is *Pseudeutropius tukree* (Sykes). A specimen in the British Museum from the Menam Chao Phya was received from the Siamese Museum in 1897. There appear to be no other records of this species for Siam. The fish is described as having the vomero-palatine teeth in four patches, nasal barbels half the length of the head, and 43 to 52 rays in the anal fin, thus agreeing with *P. siamensis* except as to the length of the nasal barbels.

In the Menam Chao Phya in the vicinity of Paknampo there occurs a species of *Pseudeutropius* which at times is fairly common and is known as *pla sai-yu* (sai-yu=hinge or hasp). I collected two specimens November 18, 1923, and four others November 20, 1923, all about 25 cm. long. Two additional specimens of the same size were collected June 6, 1928, in the Nakon Nayok River, Central

<sup>1</sup> Bulletin de la Société Philomatique de Paris, 7me series, p. 150-155.

Siam, where the fish is called *pla kate* (kate=hair). These specimens bear a close resemblance to *P. siamensis* as described by Sauvage, but all are more slender. The vomero-palatine teeth would come within the imperfect original description but are quite different from those figured by Day<sup>1</sup> for *P. taakree*. The anal fin rays are as given by Sauvage, but the dorsal fin formula is properly I, 5, not I, 6. In one of the Nakon Nayok River specimens the nasal barbels extend to the last fifth of the anal fin; in the other specimens they are somewhat shorter. These differences may be attributable to differences in size of specimens; and I am inclined to refer the specimens in hand to *P. siamensis* pending a comparison with Sauvage's type specimen.

#### XIV. SIAMESE SPECIES OF GLYPTOTHORAX.

The catfishes of the genus *Glyptothorax*, family Sisoridae, for the most part live in mountain streams where they are assisted in maintaining themselves by a thoracic apparatus by which they can adhere to stones in swift current. The known representatives of the genus in Siam number four:

*Glyptothorax major* (Boulenger). Known only from Borneo until recorded by me from Siam in 1929 (Journal Siam Society, Natural History Supplement, Vol. VIII, No. 1). The fish has as yet been taken in only one stream near the base of Kao Sabap, Southeast Siam.

*Glyptothorax dorsalis* Vinciguerra. In addition to the example of this species from an upper tributary of the Tapi River, west of Bandon in Peninsular Siam, referred to in Journal of the Siam Society, Natural History Supplement, Vol. IX, No. 1, where, through a typographical error, the generic name is given as *Gymnothorax*, there are now in hand specimens from the Meyuam, at Mesarieng, North Siam, five taken October 3, 1932, and one January 23, 1933. These specimens from the Salwin basin agree well with Vinciguerra's description and figure of his type from Burma.

*Glyptothorax siamensis*, Hora. This species, described from

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<sup>1</sup> Fishes of India.



a hill stream in Nakon Sritamarat, Peninsular Siam (Journal of the Natural History Society of Siam, Vol. VI, No. 2, 1923), is as yet known only from the type. It is quite similar to *G. platypogonoides* (Bleeker) from Sumatra, but after a recent reexamination is regarded by Dr. Hora as distinct.

*Glyptothorax prashadi* Mukerji. Six specimens of a *Glyptothorax* taken by me in July, 1928, at two points in Klong Tadi, a stream that flows eastward from the lofty mountains west of the town of Nakon Sritamarat, Peninsular Siam, have been found to differ from *G. siamensis*. They were examined by Dr. Hora and Mr. Mukerji at the Indian Museum in Calcutta and determined to be identical with *G. prashadi* recently described by Mukerji from the Mergui District of Lower Burma.

#### XV. THE SEA CATFISH *Tachysurus leiotocephalus*.

The most abundant and commercially the most important of the sea catfishes of Siam is *Tachysurus leiotocephalus* (Bleeker). It goes in large schools and is often caught in immense numbers in bamboo traps set around the shores of the Gulf of Siam, but is of irregular appearance; a large run in a given district may last only one day or a few days and be not repeated for months or even years.

This is a comparatively large species, normally reaching a length of 40 to 50 cm. It is known as *pla tukang* throughout Siam. In Malaya the fish is called *pedukang* and *belukang*,<sup>1</sup> names which are obviously related to *tukang*. A peculiarity by which the fish may be easily recognized is the large, broadly-ovate occipital process. This process readily becomes detached in fully cleaned skulls and may often be found on beaches where carcasses of the fish have disintegrated.

In February, 1924, a deep-water trap off Bangplasoi at the head of the Gulf of Siam took 5,000 *pla tukang* in one day. On February 14 this was practically the only kind of fresh fish in the Bangplasoi market, and examples of medium size (30 cm.) were selling at retail at 10 satangs apiece. At Lem Sing, Southeast Siam,

<sup>1</sup> C. N. Maxwell. Malayan Fishes. 1921.

a local trap caught over 1,000 large *pla tukang* in one night in January, 1924, but no fish were seen during the next two years. During the southwest monsoon of 1923 the extensive trap fishery centering at Chumporn, Peninsular Siam, yielded exceptionally large quantities of *pla tukang*, and on September 25 over 100,000 salted and dried fish of this species were on hand awaiting sale in Bangkok. Owing to the low market price (3 ticals per picul) and the high rate of the inland tax (10 per cent on an assessed valuation of 13 ticals per picul), many fishermen could not dispose of their holdings and had to throw them away, as owing to the high oil content in the dried fish spoilage occurs rather soon.

XVI. NOTE ON EGGS AND YOUNG OF THE SWAMP EEL *Fluta alba*.

The swamp eel or rice-field eel *Fluta alba* (Zuiew) is common and widely-distributed in the fresh waters of Siam. It is a fish of swamps, ponds, ditches, canals, and sluggish waters generally. It is extensively caught for domestic consumption and sale in the fishing districts, and at times considerable quantities reach the Bangkok markets. Among the Siamese fishermen it is known as *pla lai*, a name shared with other eels. Very few observations have been made in regard to the reproduction, eggs, and young of this fish, and there are practically no references to these subjects in the literature. It is now intended to record a few facts, applicable to the fish in Bung Borapet, in the hope that persons favorably situated for observing this "degraded rather than primitive" eel may be constrained to clear up some of the obscure points in its life history.

This species abounds in Bung Borapet, the large swamp-lake in Central Siam near Paknambo which has been set aside as a fish preserve and nursery. It is known by the local fishermen that the spawning period is from July onward and that the eggs are laid in shallow water near a bank. A parent eel at spawning time blows up a mass of bubbles which float at the surface like those of various species of anabantid fishes (*Betta*, *Trichogaster*, etc.) and serve as a nest, but whether the male or the female performs the nest-making act is not definitely established; the local people believe it is the female.



The eggs are deposited in the bubble mass, but how fertilization occurs and how the eggs are placed among the bubbles remain to be determined. The rafts of eggs, not held in one position by grass stems or other vegetation but floating freely in open water, are known to the people of the swamp, who have observed that the bubble mass takes on a deeper color as the incubation proceeds.

The number of eggs laid, the hatching period, and the duration of the egg-laying season are unknown.

On July 12, 1931, Luang Anantamasya Pithaks, of the Siamese Department of Fisheries, discovered a school of young eels of this species at the surface in open water of the bung about two meters from the bank, the water under the young being about 15 cm. deep. From a hole in the bottom, between the young eels and the bank, the head of an adult eel, supposed to be the mother, projected. The eels numbered several hundred and were mostly in a compact mass 20 to 25 cm. wide, but a few were scattered beyond the limits of the school. When some of the eels were scooped from the mass with a coconut shell, the adult eel withdrew into the hole out of sight and made no attempt to defend the young.

The young were of a pale brownish color; the upper part of the body and head was thickly covered with minute dark brown spots; a dark line extended from the eye to the snout, and a dark stripe about as broad as the diameter of the eye extended downward and backward from the eye; the vertical fins were transparent. The young varied in length from 27 to 36.5 mm., the average for 29 specimens being 33.6 mm.

#### XVII. NEW CYPRINOID FISHES.

##### ***Chela maculicauda***, new species.

*Description*.—Oblong, strongly compressed; dorsal profile from snout to a point about half distance to dorsal fin straight, thence to dorsal fin slightly convex; abdomen moderately convex, with sharp edge; greatest depth of body rather more than one third standard length, caudal peduncle deeper than long, its least depth .5

head; head 4.2 times in standard length; eye 2.75 in head, somewhat longer than snout and interorbital space; chin very slightly prominent; scales in longitudinal series about 42, in transverse series 10.5-1-5, around narrowest part of caudal peduncle 18.

Fins: Dorsal rays ii,7, longest ray about equal to head less snout and longer than longest anal ray, origin of fin midway between head and base of caudal; caudal deeply forked, much longer than head, lower lobe distinctly longer than upper; anal rays ii,25, anal base contained 3.5 times in standard length; ventrals reaching anal, about .6 length of head; pectorals extending to anal, 1.6 times length of head.

Coloration: Back pale green; a narrow silvery lateral band somewhat above level of eye, extending from head to base of caudal; lower parts silvery white; muzzle slightly dusky; caudal fin with a small sharply-defined black spot on each lobe, the spot on the lower lobe more posterior than that on upper lobe, other fins plain.

*Type and other specimens.*—The type, 5.5 cm. long, was taken in Klong Ranode, an affluent of Tale Sap, Peninsular Siam, October 9, 1923. Two other specimens, entirely similar, were taken at the same time and place.

*Remarks.*—The black spot on each caudal lobe serves to identify this fish and to distinguish it from any other *Chela*, so far as the writer knows.

The fish is as yet known only from the foregoing specimens collected by the writer in 1903. Collecting in other years in all parts of the Tale Sap and its tributaries did not yield this form.

### ***Rasbora borapetensis*, new species.**

*Description.*—Depth 3.6 in standard length, least depth of caudal peduncle 1.5 in its length and .5 depth of body; head equal to depth of body; eye slightly longer than snout, somewhat less than interorbital space, and contained a little over 3 times in length of head; cleft of mouth more vertical than horizontal, symphysial knob of lower jaw and corresponding emargination of upper jaw feebly



developed, the emargination on level with upper edge of eye; scales in lateral series 30, perforated scales forming lateral line 10 to 14, scales in transverse series 8 (5 above lateral line), predorsal scales 12, scales around narrowest part of caudal peduncle 12.

Fins: Origin of dorsal slightly nearer to base of caudal than to tip of snout, dorsal rays ii,7, height equal to length of head; anal rays iii,5, height less than that of dorsal; caudal longer than head, median rays .5 length of lobes; ventrals not reaching anal; pectorals somewhat longer than and not reaching ventrals, and shorter than head.

Coloration (life): Back and upper part of head pale yellowish-green, the dorsal scales with light edges containing dark spots; lower half of body and under side of head silvery white; a black lateral band narrower than eye extending from gill opening to base of caudal fin; a glistening golden-green band immediately above the black band and narrower than it; a narrow black line on either side of the anal base continued as a single line on lower edge of caudal peduncle; opercle glistening silvery, with numerous small black spots on its upper part; muzzle dusky; all fins hyaline, base of caudal bright carmine.

*Type*.—The type, taken in Bung Borapet, Central Siam, December 4, 1932, and preserved in Bangkok October 7, 1933, is 4.8 cm. long.

*Remarks*.—This is a small, very abundant species which as yet is known only from Bung Borapet, near Paknambo, Central Siam. It is readily recognizable by the incomplete lateral line (which never extends beyond the anal fin), by 12 rows of scales around the narrowest part of the caudal peduncle, by the origin of the dorsal fin well behind the origin of the ventrals, by the broad black lateral band bordered above by a narrower golden-green band, and by the carmine basal half of the caudal fin. In some of the larger specimens all the fins become dusky.

In the type specimen the perforated scales of the lateral line number 10 on one side and 14 on the other. In other specimens the scales on the two sides usually agree and number 14, but may be

several less, though never more. The fourteenth perforated scale is just above the origin of the anal fin.

This is an active, hardy, attractive aquarium fish. Specimens have been kept alive in good condition for more than a year at the Department of Fisheries in Bangkok, feeding on mosquito larvae and minute crustaceans. The type appears to represent the maximum size attained.

***Xenoeheilichthys***, new genus (Cyprinidae).

Oblong, compressed; snout bluntly rounded, with central and lateral lobes, no pores or tubercles; mouth small, inferior, horizontal, strongly arched; upper lip thick, fleshy, joined to lower lip by a thin frenum; upper lip overhung by a thin rostral fold from which a long slender lateral process extends backward and downward to join the posterior part of the upper lip at angle of mouth, the process lying in a groove which extends around the angle of the jaws and is continued upward toward the nostrils, thus dividing the central and lateral parts of the snout; lower lip thin, practically confined to sides of the jaw; a post-symphysial tubercle on lower jaw; nostrils close together near eye; no barbels; eye with a narrow annular eyelid; pharyngeal teeth 4,3,2-2,3,4, closely set, partly uncinat and partly molar; scales very deciduous, of moderate size, lateral line complete and running along middle of caudal peduncle; gill membranes broadly joined to isthmus; gill rakers numerous. Dorsal fin short, with 8 branched rays and a strongly ossified, dentated spine; anal fin with 5 branched rays and an ossified spine.

This genus resembles *Amblyrhynchichthys* in having an annular eyelid, a postsymphysial tubercle on the lower jaw, no barbels, a short blunt snout, a short dorsal fin with strongly ossified and serrated spine, etc. It may, however, be readily distinguished from that genus by the shape of the snout (which, while blunt and rounded, is not high and obliquely truncate), by the shape and position of the mouth (which does not reach the vertical from anterior border of eye while in *Amblyrhynchichthys* it extends to a point under middle of eye), by the position of the nostrils (nearer eye than to tip of snout), by the very thick, broad, and soft upper lip, by the



deficient lip in the middle of the lower jaw, by the shape of the rostral fold, etc. Although *Amblyrhynchichthys* is not described as having central and lateral rostral lobes, as a matter of fact "the broad triangular fold in the middle of the snout" as stated by Weber and de Beaufort<sup>1</sup> is in reality a central lobe which partly covers the very thin upper lip and is produced backward on each side as a slender process to the angle of the mouth, as in *Xenoeilichthys*. The figure of Weber and de Beaufort<sup>1</sup> is defective in showing a sharp line of demarcation between the base of the fold and the snout.

Outstanding differential characters of the two genera are set forth in the following comparison:

Snout viewed from the side high and obliquely truncate;  
a small median rostral lobe whose base is far below level of nostrils; mouth entirely below lower level of eyes, the maxillary extending to a point under anterior edge of pupil; lips thin and firm; nostrils nearer to tip of snout than to eye, on anterior surface of over-hanging edge of snout.....*AMBLYRHYNCHICHTHYS*.

Snout viewed from the side evenly decurved and rounded;  
a large median rostral lobe whose base is near nostrils; mouth entirely above lower level of eyes, the maxillary not reaching a vertical from anterior edge of eye; upper lip very broad and soft; nostrils nearer to eye than to tip of snout, on upper surface of snout.....*XENOEILICHTHYS*.

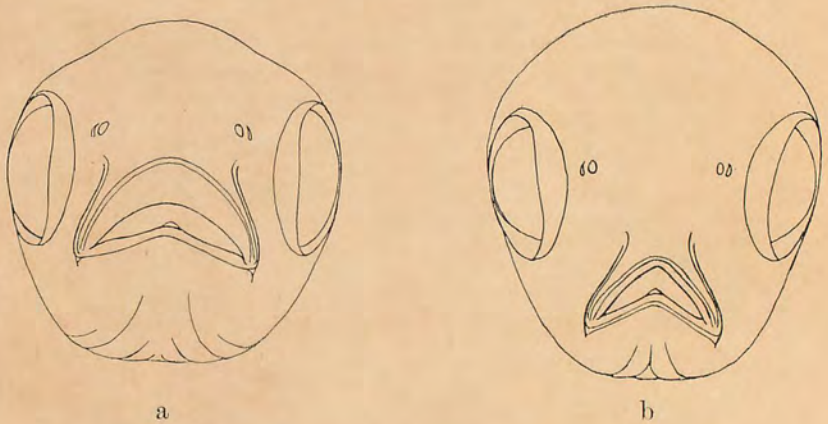
### *Xenoeilichthys gudgeri*, new species.

*Description*.—Depth 2.5 in standard length, least depth of caudal peduncle 1.5 in its length; dorsal and ventral profiles similar; head short, blunt, contained over 4 times in standard length, its greatest depth 1.2 times in its length and 1.5 times its breadth; eye large, 3 in head, 1 in the convex interorbital space, with an annular adipose lid widest anteriorly; snout blunt, rounded, .5 eye, slightly overhanging the strongly arched horizontal mouth, a thin rostral fold covering base of upper lip, a shallow groove on either side dividing snout into a central and two lateral parts; lateral part of central lobe prolonged as a slender process which widens posteriorly and joins the upper lip behind corner of mouth; upper lip thick, soft, confluent with upper jaw, a thin frenum joining it to the much less developed lower lip; pharyngeal teeth as in generic description; nos-

<sup>1</sup> Fishes of Indo-Australian Archipelago, III.

trils separated by a low partition, nearer to eye than to tip of snout; gill rakers short, close together, truncate, spiniferous, about 30 on lower arm of first arch; lateral line gently decurved; scales deciduous, in lengthwise series 31 or 32, in transverse series 5.5-1-5.5, around narrowest part of caudal peduncle in 16 rows, in predorsal region 10; a scaly sheath at base of dorsal and anal fins.

Fins: Dorsal rays iv,8, the fourth spine strong, with about 15 teeth on its posterior border, height of fin exceeding length of head and 1.5 times in depth of body, margin deeply incised, last ray produced and .5 length of first branched ray; origin of dorsal midway



Front view of head of (a) *Xenocheilichthys* and (b) *Amblyrhynchichthys*.

Enlarged about 2 times.

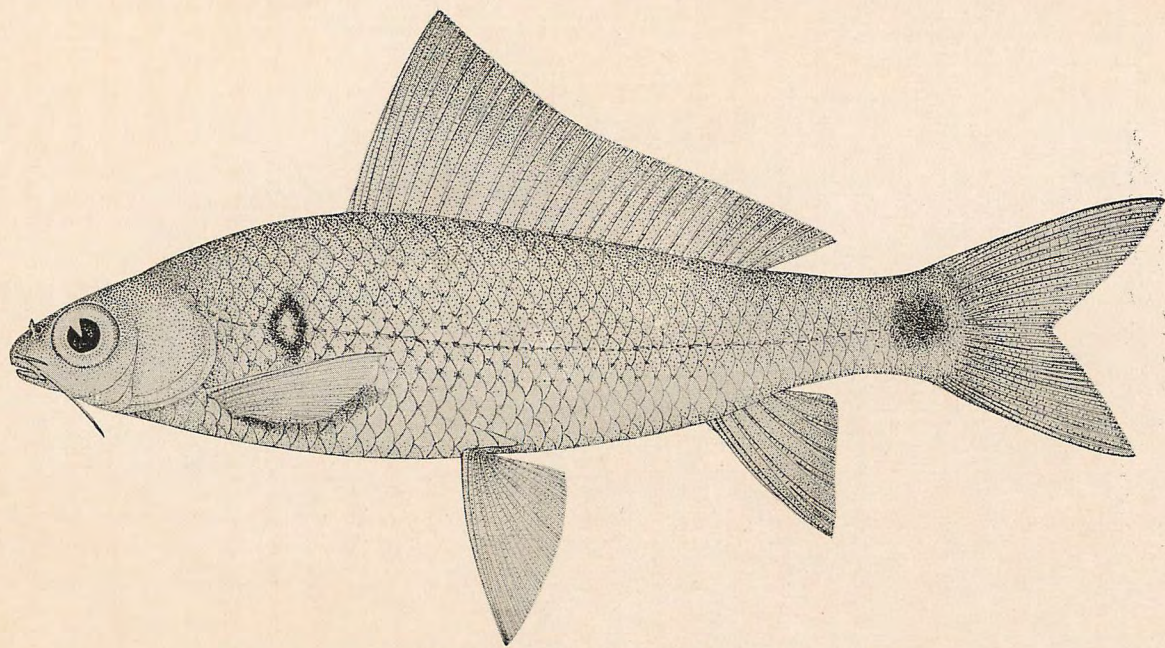
between tip of snout and base of caudal, far behind origin of ventrals, over 13th scale of lateral line; posterior end of dorsal base well in advance of anal; caudal forked, 1.25 times length of head; anal rays iii,5, last simple ray rather well ossified, as long as head less snout; origin of fin under 19th scale of lateral line; ventrals inserted nearer to first pectoral ray than to anal, about length of pectorals and shorter than head.

Color: Plain silvery; margin of dorsal blackish.

*Type and other specimens.*—The type, 14.0 cm. long, was taken in the upper Nan River, North Siam, on April 20, 1930, by Layang Gaddi, collector for the United States National Museum,







*Dangila spilopleura*, new species. Menam Tachin, Central Siam.

From a drawing by Luang Masya Chitrakarn.



Two other specimens, about 13.5 cm. long, were obtained at the same time and place.

*Remarks.*—The only known locality where this fish occurs is the upper part of the Nan River, near the town of Nan. The local name given to the fish is *pla nam fai*, apparently meaning dammed-water fish.

The foregoing description does not bring out adequately the very marked dissimilarity between *Xenocheilichthys gudgeri* and *Amblyrhynchichthys truncatus*. Some idea of the differences may be gained from the accompanying outline drawings of the front view of the head in the two species.

The suggestion that the fish under consideration may be Vaillant's *Amblyrhynchichthys altus*, known from a single small specimen from Borneo, is negatived by the fact that the latter fish is described as having 8 branched rays in the anal fin, 16 rows of scales in transverse series, and various other differences.

I take pleasure in naming this fish after Dr. E. W. Gudger of the American Museum of Natural History, New York, indefatigable student and bibliographer of fishes and prolific writer on the fishes of the world.

#### ***Dangila spilopleura*, new species.**

*Description.*—Form rather elongate, body moderately compressed, depth 3.6 in standard length, least depth of caudal peduncle 1.5 in its length and 2.5 in head; head short, broad, a slight concavity at nape, from which the profile rises in a gentle curve to the dorsal fin, length of head less than .25 standard length, its depth at nape about equal to breadth; rostral barbel reaching anterior edge of orbit, maxillary barbel more than twice as long and extending to anterior end of branchial opening; snout slightly overhanging mouth, about equal to eye,<sup>1</sup> with several rows of enlarged pores; eye more than 3 times in head and 1.6 in the broad, slightly convex inter-orbital space; scales in lateral line 44, in transverse series 7.5–1–7.5,

<sup>1</sup> In the smaller specimen figured the snout is less than the eye, the eye is 3 in head, and the first branched dorsal ray is equal to head.



around narrowest part of caudal peduncle 20, in predorsal region 12.

Fins: Dorsal rays iii,25, first branched ray slightly shorter than head and less than depth of body, origin of dorsal over 8th scale of lateral line; caudal deeply forked, lobes pointed, longer than head and equal to depth of body; anal rays iii,5; ventrals reaching anus, their origin under 14th scale of lateral line; pectorals slightly longer than ventrals and shorter than head.

Color: General color silvery, pale green on back, whitish on abdomen; scales of back and sides with a small, round dark brown spot at base, the spots forming rather vague longitudinal lines; a conspicuous irregularly diamond-shaped black spot on the lateral line above mid-length of the pectoral fin, the spot involving scales in about 7 longitudinal rows, the center of the spot uncolored and comprising the sixth scale of the lateral line; a round black spot about size of eye on caudal peduncle near base of caudal fin; dorsal and anal membranes thickly covered with black dots, the rays pale greenish; caudal pale green; ventrals pale yellow; pectorals very pale green.

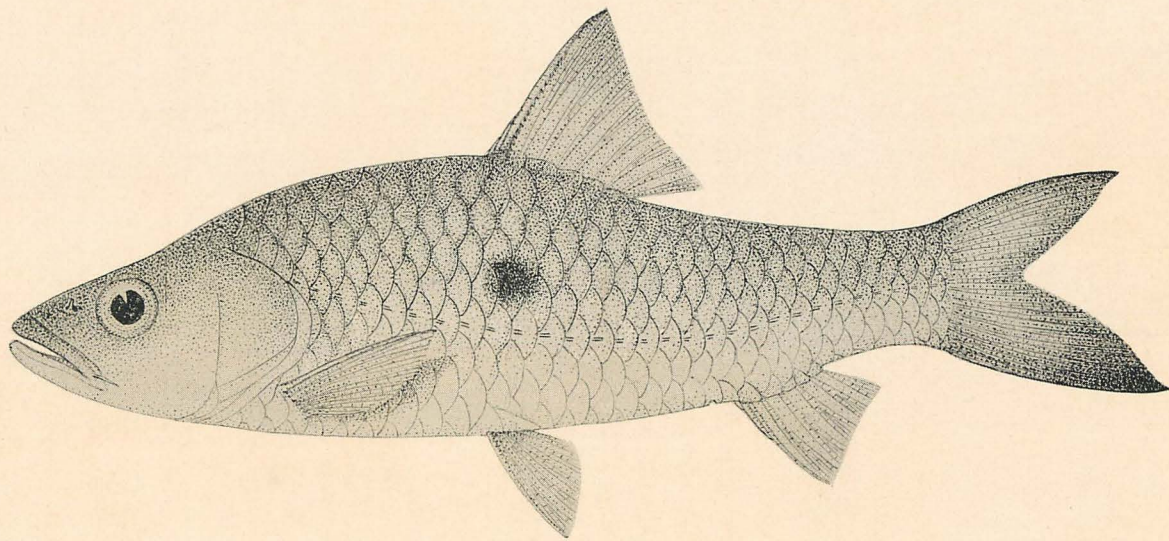
*Type and other specimens.*—The type is a female, 12 cm. long, with well-developed ovaries, taken at Hangkraben, off the Menam Chao Phya, north of Ayuthia, Central Siam, December 11, 1924. Additional specimen in the collection of the Siamese Department of Fisheries are six from Klong Don Lao, off the Tachin River, Central Siam, September 16, 1927; and one from the Nakon Nayok River, Central Siam, October 24, 1930.

*Remarks.*—No other known species of *Dangila* has the peculiar spot above the pectoral fin, although several species have a dark spot on the caudal peduncle. *Dangila ocellata* (Heckel) of Borneo and Sumatra has above the pectoral fin but below the lateral line a round black spot inferiorly edged with yellow; in this species the dorsal rays are iv,27–28, the scales in the lateral line are 60, the scales in a transverse series number about 30, and the scales around the caudal peduncle are 28.

On the Tachin River this fish is known as *pla soi luk kluey*, while on the Nakon Nayok it shares with other species of *Dangila* the name of *pla sa*.







*Hampala dispar*, new species. Nong Han, Sakon Nakhon, East Siam.

From a drawing by Luang Masya Chitrakarn.



***Hampala dispar*, new species.**

*Description.*—Profile of head straight, a slight concavity at nape, profile of back very slightly arched; depth about 3.3 in standard length, caudal peduncle 2.5 in depth of body, 1.5 in its own length and 2.5 in head; head about equal to depth; eye slightly shorter than snout, 4.5 in head, 1.5 in the nearly flat interorbital space; maxillary extending to a vertical from front border of eye; a maxillary barbel less than one-third diameter of eye; scales in longitudinal series 28, in transverse series 4.5–1–4.5, around narrowest part of caudal peduncle 12, in predorsal region 10.

*Fins:* Dorsal rays iii,8; third simple ray feebly ossified and weakly denticulated on basal half, 1.5 in head; origin of dorsal midway between tip of snout and base of caudal, slightly posterior to origin of ventrals and opposite 9th scale of lateral line; caudal broad, deeply forked, as long as head less snout, lobes bluntly pointed, lower lobe longer; anal rays iii,5; length of last simple ray two-thirds that of dorsal; ventrals .5 head, somewhat shorter than pectorals, with a long axillary scale; pectorals not reaching ventrals.

*Coloration:* Back green, sides and belly silvery; a round black spot slightly larger than eye on side above lateral line, midway between dorsal and ventrals; caudal lobes diffused blackish distally, with an indistinct blackish band along margin of each lobe; other fins plain.

*Type.*—The type is a specimen 17.0 cm. long to end of caudal fin, 13.7 cm. long to base of caudal, taken from the Menam Mun, at Ubon, East Siam, March 24, 1929.

*Other specimens.*—Additional specimens in the collection of the Siamese Department of Fisheries are: One, a female 17.3 cm. long, taken by H. M. Smith in Nong Han, Sakon Nakon, East Siam, March 10, 1929; and two, one of each sex and both 15.0 cm. long, obtained by Boon Chuay Indrambarya in the market at Sakon Nakon, May 2, 1934, obviously from Nong Han, both having the lower lobe of the caudal distinctly the larger.

*Remarks.*—As regards general shape, squamation, fin rays, and most other characters this form agrees closely with *Hampala*

*macrolepidota*, a very common, widely distributed fish in Siam, Burma, India, and East Indian Archipelago; but in coloration it differs strikingly, and in certain minor morphological features it appears to present constant differences. For example: the caudal fin is shorter, the lower lobe is distinctly larger, and the barbel at the corner of the mouth, which in *macrolepidota* is nearly or quite as long as the eye, or every much longer (as in Bleeker's plate in Atlas Ichthyologique), in the new form does not exceed one-third the diameter of the eye in any of the specimens in hand. In all published descriptions of *macrolepidota* and in all figures of that species, the lateral spot is represented as vertically elongated, sometime extending nearly the entire depth of the body and always crossing the lateral line, while in *dispar* the spot is always rounded or very slightly elongated horizontally and never involves the lateral line, being always above it. The caudal fin in *macrolepidota* shows on the full length of each lobe a broad, sharply-defined blue-black marginal band, while in the new form the marginal band is poorly defined and the caudal lobes are diffused blackish in their distal part.

The information and extensive material at hand indicate that in Siam this form is peculiar to the basin of the Mekong. Typical *macrolepidota*, however, is found in some of the same waters. Although the various reports on the fishes of French Indo-China make no mention of the form under consideration, it nevertheless has been shown to occur at least in Cambodia and has been collected by the present writer in the Seamreap River, an affluent of Grand Lake or Tonle Sap, and has been observed by him elsewhere in Cambodia.

In Nong Han at Sakon Nakon, at Ubon, and in other parts of East Siam, this fish is called *pla soot*, evidently a contraction and corruption of *pla kusoob*, by which Hampala is generally known in Siam.

**Puntius (Barbodes) jolamarki**, new species.

*Description*.—Moderately elongate, strongly compressed, back elevated, profile from tip of snout to dorsal fin nearly straight;



maximum depth contained 2.6 times in standard length, 3.6 times in total length; least depth of caudal peduncle slightly less than its length and somewhat more than .5 length of head; head short, less than .25 standard length; snout short, less than eye; mouth terminal, strongly arched, its width at corners less than length of snout; 4 short barbels, the maxillary pair much less than eye, the rostral pair still shorter; eye large, 2.6 in length of head, 1.25 in slightly convex superior interorbital space, and 1 in inferior interorbital space; eyes placed low on side of head, middle of pupil in a horizontal line from tip of lower jaw when mouth is closed; lateral line gently decurved; scales in longitudinal series 31, in transverse series 5.5-1-5.5, in predorsal region 10, and about narrowest part of caudal peduncle 16; a scaly sheath at base of dorsal and anal fins.

Fins: Origin of dorsal over 11th lateral line scale, about midway between tip of snout and base of central caudal rays, and posterior to origin of ventrals a distance equal to diameter of eye; dorsal formula iii,8, the third simple ray strongly ossified and armed with 14 serrations, the ossified ray and its soft prolongation longer than head; caudal fin deeply forked, the lobes acute, much longer than head; anal rays iv,5, the simple rays weak; origin of ventrals under 8th lateral line scale, the first ray slightly produced but not reaching anus; pectorals reaching ventrals, somewhat longer than they and slightly shorter than head.

Coloration: Silvery; fins plain.

*Type*.—The type is 14.2 cm. long and was taken with a cast net in the Memam Chao Phya at Bangsorn, Bangkok, July 19, 1925. Another specimen 12.5 cm. long, obtained at the same time and place, agrees perfectly with the type.

*Remarks*.—The most salient features of this species are the nearly straight dorsal profile and the large eye placed low on the side of the head, so that the interorbital distance measured under the head is less than the distance measured over the head. This species resembles *Puntius brumoides* Bleeker, known from Siam and Borneo, but the back is less elevated and not arched, the caudal peduncle is more slender, and the eye is placed much lower on the side of the head.

Sauvage's rather imperfectly described *Puntius siamensis* from the Menam Chao Phya is a deeper fish, with fewer rows of scales between the dorsal and ventral fins, and with the ventral fins attached below the middle of the dorsal (whereas in *P. jolamarki* they are entirely in advance of the dorsal). In extensive collecting in the basin of the Menam Chao Phya no fish referable to *P. siamensis* has been obtained; and the reference to pores on the snout in the original description raises doubt as to whether the fish is really a *Puntius*.

It is a pleasure to name this species for Phya Jolamark Bicharana, B. Sc. (Edinburgh), Director-General of the Royal Department of Irrigation, in recognition of his sustained interest in the fishes of Siam and solicitude for their welfare.

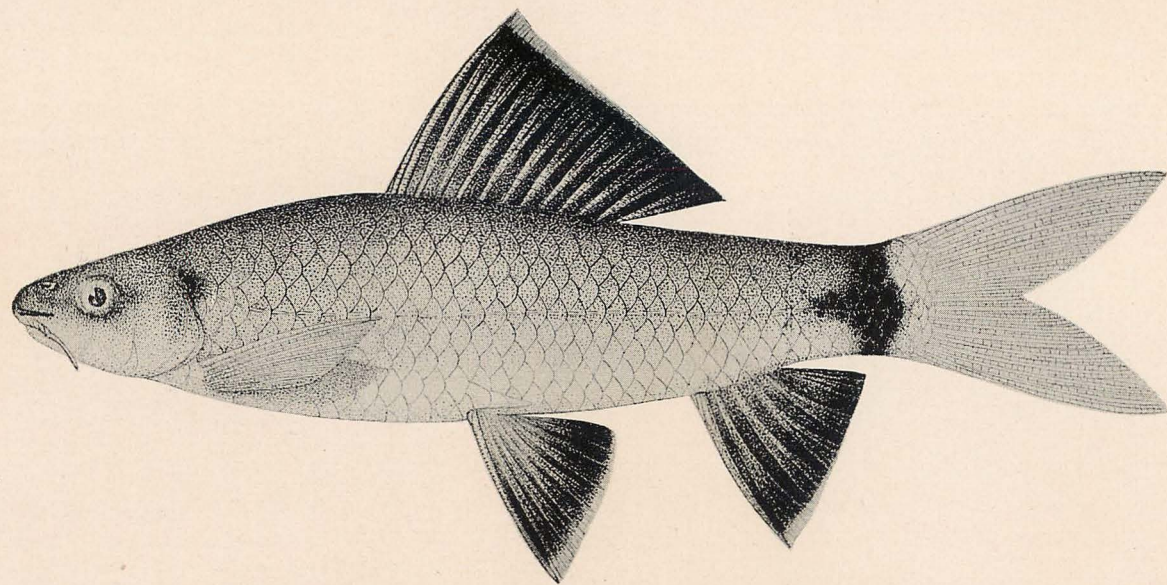
***Puntius (Barbodes) daruphani*, new species.**

*Description*.—Form comparatively short and stout, strongly compressed; dorsal profile from snout to nape nearly straight, from nape to dorsal fin arched, with a slight concavity at nape; depth at origin of dorsal fin about 2.3 in standard length, least depth of caudal peduncle equal to its length, 1.7 in length of head, and 3 in depth of body; and head short, pointed, 3.9 in standard length; eye 3.5 in head, equal to snout, and 1.3 in the slightly convex interorbital space; two pairs of barbels, rostral about equal to eye, maxillary longer; posterior end of maxillary reaching a vertical from a point between anterior border of eye and posterior nostril; scales thin, 27 in lateral series, 4.5–1–4.5 in transverse series, 8 before dorsal fin, and 14 around narrowest part of caudal peduncle; a scaly sheath at base of dorsal and anal fins.

Fins: Dorsal origin nearly over ventrals, rays iv,8, last simple ray as long as head, strong, osseous, and coarsely serrated on its posterior border; height of dorsal more than length of head, posterior margin deeply incised, last ray more than .5 head; caudal deeply forked, lobes acute and much longer than head; anal rays iii,5, third simple ray rather strongly ossified, height of fin nearly equal to head, posterior margin deeply incised; ventral and pectoral







*Labeo munensis*, new species. Menam Mun, East Siam.

From a drawing by Luang Masya Chitrakarn.



fins subequal and slightly shorter than head.

Coloration (life): General color golden, each scale of back and sides with a dark brown base; caudal peduncle with a distinct bluish-silvery speen; iris white; dorsal fin hyaline; caudal hyaline, with a broad silvery-green posterior edge; anal milky-white anteriorly; ventrals orange; pectorals bright yellow.

*Type*.—The type, 13.5 cm. was taken by the writer on a line in the Meping at Raheng, Central Siam, October 17, 1926

*Remarks*.—The closest relative of this species is *Puntius huguenini* (Bleeker), known only from two specimens from Sumatra. That species, however, is more elongated (depth 2.5 to 2.7, head 4.3 to 4.7), has a different profile (with no concavity at nape), has much finer and more numerous serrations on the last simple dorsal ray, and has 10 predorsal scales. A specimen from the type locality presented to the Zoological Museum in Amsterdam and kindly examined by Dr. L. F. de Beaufort was regarded by him as differing from *P. huguenini* in the characters indicated. A third specimen taken in Nong Or, a lake near the Meklong at Ban Pong, on September 8, 1930, is 16.3 cm. long and agrees closely with the type. The dark vertical spot at the base of the scales is most distinct on a group of about 8 scales involving the lateral line above the pectorals. At both Raheng and Ban Pong this fish is known as *pla tapak*.

This species is named in honor of Phya Daruphan Pitaks, Chief Conservator of Forests of Siam, through whose interest many species of fishes have been added to the known fauna of North Siam, through collections made by forest officers.

### *Labeo munensis*, new species.

*Description*.—Form elongate, dorsal profile gently curved from occiput to dorsal and nearly straight from snout to occiput; body rather strongly compressed, depth about 4 in standard length; caudal peduncle rather short, its least depth 1.25 in its length and more than .5 head; head small, conical, 4.5 times in length, its depth about 1.25 times its breadth; snout 1.5 times eye, overhanging the mouth, viewed from above broadly rounded, with a lateral lobe; free

rostral fold crenulated and completely concealing upper lip; rostral barbel about diameter of eye, maxillary barbel .5 longer; top and sides of head covered with minute pearly tubercles; mouth small, its posterior angle nearer to eye than to tip of snout; eye in mid-length of head, small, 4 times in head and 1.5 times in the broad, convex interorbital space, eye partly covered anteriorly by a well-defined fatty lid; lateral line nearly straight; scales in lateral series 36, in transverse series 5.5-1-5.5, around narrowest part of caudal peduncle 16, between dorsal fin and occiput 12.

Fins: Dorsal rays iii, 11; origin of fin far in advance of ventrals, over 10th scale of lateral line; dorsal margin straight, longest branched ray nearly equal to depth of body and 1.2 times length of head, the rays becoming gradually shorter, the last ray .5 first; length of dorsal base equal to distance from fin to occiput; caudal long, 1.4 times length of head, deeply forked, the lobes pointed; anal rays iii, 5, the longest equal to head, the last .5 first branched ray; anal margin truncate, origin of fin under 25th scale of lateral line; ventrals equal to head, not reaching anal, origin under 14th scale of lateral line; pectorals slightly shorter than ventrals.

Color: General color reddish-brown, below creamy white; across caudal peduncle a black band with an anterior prolongation along lateral line; a dusky spot behind eye; snout dusky; a small black post-opercular spot; rostral barbel jet black; dorsal fin blue-black, the tips of the anterior rays pale; caudal pure white, with a yellow tinge at base; anal black, with the margin pale anteriorly; ventrals pale at base, median part black, margin white; pectorals hyaline.

*Type*.—The type specimen, 9.3 cm. long, was taken in the Menam Mun at Tha Chang, east of Korat, East Siam, November 22, 1926, by Phra Anuwati, at that time divisional forest officer. The Mun flows in a generally easterly direction into the Mekong.

*Remarks*.—This fish is as yet known only from the type and a second specimen, similar to the type, 8.0 cm. long, from the same point in the Menam Mun. It is a rather striking species with its large black dorsal, anal, and ventral fins, long white caudal, and



small, pointed head. The local name is *pla soi lord*, which may be rendered into English as "tubular school fish."

XVIII. THE BLENNIID FISHES OF SIAM, WITH  
DESCRIPTIONS OF NEW SPECIES.

GENERAL.

There appears to be no published record of any blennioid fishes from the waters of Siam. Blennies, however, are rather common on many parts of the coast of Siam, and numerous specimens have been collected by the writer and his assistants in the Siamese Department of Fisheries. Further collecting will doubtless add to the number of local species, but in the meantime it is thought desirable to place on record a list of the forms that have so far been found. These fall into 6 genera and represent 11 species, of which 4 are regarded as new to science and are herein described.

With one exception, all of the known Siamese blennioids are in the family of Blenniidae and are of very small size, inhabiting the shallow waters of rocky shores of the mainland and islands, especially tide pools. They exhibit a considerable variety of form, but all have long dorsal and anal fins, and ventral fins of reduced size and jugular position. The commonest of the local species, belonging in the genus *Salarias*, have a peculiar, not to say grotesque, physiognomy, by which, together with cephalic crests and tentacles, they may be readily recognized. All are very active and difficult to catch, and some of them skip over the surface and leap from rock to rock with great agility.

Some of the European blennies have been studied as regards habits, reproduction, etc., but there have very few observations on Asiatic species, and the Siamese forms are an interesting subject for investigation.

In the following key there are included not only the genera of blennies actually known from the waters of Siam but also genera occurring in India, the East Indies, the Philippines, and other oriental regions which may be looked for in Siam. The genera not yet detected in local waters are designated by an asterisk (\*).

*Key to blennioid fishes to be looked for in Siamese waters.*

- I. Body scaly.
  - a. Scales ctenoid; dorsal fin divided into 3 distinct parts....ENNEAPTERYGIUS.\*
  - aa. Scales cycloid; dorsal undivided, consisting of many spines and a few soft rays.....ANTHOCLINUS.\*
- II. Body unscaled.
  - b. A single long dorsal fin without branched rays.
    - c. Dorsal and anal fins not confluent with the caudal.
      - d. Gill openings restricted to sides; no sucker on lower jaw.....PETROSCIRTES.
      - dd. Gill openings wide; a sucking disc on lower jaw.....ANDAMIA.\*
    - cc. Dorsal and anal fins confluent with the caudal.
      - e. Form very elongate, compressed, eel-like; dorsal fin arising before eyes; middle caudal ray produced into a long filament.....XIPHASIA.
      - ee. Form not greatly elongate, not eel-like; dorsal fin not arising in front of eyes; middle caudal ray not filamentous.....ENCHELYURUS.
  - bb. Dorsal fin more or less divided by a notch separating spinous and soft parts.
    - f. Teeth of front of jaws inserted on lips and freely movable; gillmembranes free from isthmus.
      - g. Jaws without posterior canines; dorsal fin deeply notched.....SALARIAS.
      - gg. One or both jaws with posterior canines; dorsal more or less notched.....ALTICUS.\*
    - ff. Teeth of front of jaws attached to bone and not movable.
      - h. Gill membranes free from isthmus or forming a distinct fold across it.
        - i. A transverse nuchal row of filaments.....CIRRIPECTES.
        - ii. No transverse nuchal row of filaments.....BLENNIUS.
      - hh. Gill membranes broadly united to isthmus; gill openings restricted to sides.....HYPLEUROCHILUS.\*

***Petroscirtes mitratus* Rüppell.**

This is a species of every wide range in the Indian and Pacific oceans, the East Indies being the region nearest to Siam from which the fish has been recorded. Its place in the Siamese fauna rests on three specimens 1.5 to 3.9 cm. long taken in a tide-pool at Lem Sing, Southeast Siam, April 5, 1930.

***Petroscirtes masyae*, new species.**

*Description.*—Form very elongate, head and body much compressed; depth 6 times in standard length, head 5 times in length, depth of caudal peduncle at last dorsal and anal rays 2.5 times in head; snout strongly decurved; eye slightly less than snout, 4 in head and 2 times flat interorbital space; mouth inferior, maxillary reaching opposite pupil, lateral canine in lower jaw long and curved;



width of gill-slit less than diameter of eye; skin smooth, no cephalic tentacles; conspicuous pores on lower jaw and preopercle.

Fins: Dorsal rays 32, those in posterior part of fin much the longer; middle anterior dorsal rays .5 head, middle posterior rays 1.2 times in head; origin of dorsal over gill opening; last dorsal ray joined to caudal fin by a membrane and reaching on caudal when flexed; caudal fin rounded, shorter than head; anal rays 22, shorter than anterior dorsal rays, posterior ray not reaching on caudal when flexed, origin of fin posterior to 12th dorsal ray; length of anal base .5 standard length of fish; anal membranes deeply incised; pectorals bluntly pointed, as long as head less snout; ventrals .5 head.

Color (in life): Body and head sap green, abdomen pale yellowish-green; back with 10 or 11 dark green cross-bars which meet at the median dorsal line; posterior half of body with a row of dark green spots along longitudinal axis; a dark green blotch on back anterior to dorsal fin; 5 longitudinal dark green lines on back and sides, upper and longest immediately below the cross-bars, extending from head to under posterior dorsal rays, other lines progressively shorter, fourth and fifth confluent behind pectoral and extending about half length of body; head with 3 dark brownish cross-bands, one across opercle, one behind eye, one under anterior part of eye, the bands of the two sides confluent on under side of head and sharply defined, the anterior band just back of teeth; dorsal pale yellowish, a row of dull orange spots along rays; caudal transparent pale green and yellow, upper and lower edges orange; anal rays and outer part of membranes pale purple, basal part of membranes lighter purple, margin of each membrane white; pectorals and ventrals pale green.

*Type*.—A specimen 5.9 cm. long, taken on March 17, 1930, in a tide pool on Koh Chula, a rocky islet in the Gulf of Siam off Lem Sing, Southeast Siam.

*Remarks*.—This attractive blenny has been met with only in and off the estuary of the Chantabun River. In the extensive collecting that has been done in that locality, only one specimen in addition to the type has been obtained, and the inference is that it is

a rather rare species. The second specimen was taken in the estuary on August 31, 1931; it is 5.3 cm. long and of somewhat paler coloration than the type. The fish is easily recognizable by its green color, the five lateral stripes, and the three distinct brown cross-bands on the under side of the head.

The species is named for Luang Masya Chitrakarn, of the Siamese Department of Fisheries, in slight recognition of his zealous efforts which have added greatly to the knowledge of the fish life of the Chantabun region and other parts of Siam.

***Enchelyurus ater* (Günther).**

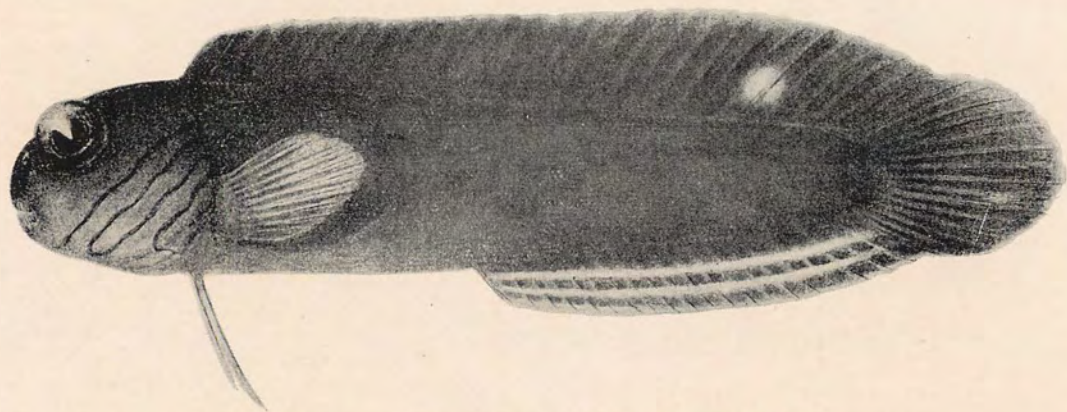
This is a diminutive species of wide distribution in the Pacific. The recorded specimens have been from 14 to 35 mm. long. It is known from Hawaii, Samoa, Tahiti, and is now given a place in the fauna of Siam by the taking of a specimen 32 mm. long on a coral reef at Koh Tan, a small island off Koh Samui, Gulf of Siam, August 7, 1931, by Luang Masya Chitrakarn and Nai Boon Chuay, of the Siamese Department of Fisheries. The specimen was uniformly jet black, with the pectorals paler.

***Enchelyurus analis*, new species.**

*Description*.—Moderately elongate, strongly compressed, greatest depth of body, at junction with head, 4.25 in standard length, 5.25 in length with caudal fin; head less compressed than body, rather short and deep, its length equal to depth of body, its depth more than .9 its length, its width equal to postorbital part of head, its dorsal profile strongly arched; snout very short and blunt, its length less than .5 eye; eye large, in anterior half of head, projecting slightly beyond dorsal profile, less than 3 in length of head; interorbital space flat, .6 eye.

Fins: Dorsal and anal confluent with caudal, with a shallow notch marking the point of juncture; dorsal rays 31, longest posteriorly, 1.5 in head; origin of dorsal slightly in advance of gill opening; caudal rounded, central rays somewhat shorter than head; anal rays 22, shorter than dorsal, longest 2.25 in head; origin of anal under 14th dorsal ray, midway between base of caudal and center of





*Enchelyurus analis*, new species. Koh Tao, Gulf of Siam.  
From a photograph of a water-color drawing by Luang Masya Chitrakarn.





eye; ventrals inserted well in advance of pectoral base, in line with origin of dorsal, outer ray longer, 1.3 in head, extending somewhat more than .5 distance to anal; pectorals rather broad, bluntly pointed, their length equal to ventra's.

Color in life: General color uniform very dark brown, lighter on lower half of head and on belly; five blackish wavy lines extending from gill opening obliquely downward and forward across opercle; dorsal and caudal fins like body; a round light spot, smaller than eye, involving basal part of 26th dorsal ray and contiguous membranes; anal with seven longitudinal bands and stripes: the basal band like body, then a narrow light blue band, followed by a broader orange-red band, which is bordered distally by another narrow light blue band, then a broader dark olive band and a third narrow light blue band which has a dark blue edge; ventrals brown; pectorals light green; iri+ reddish.

*Type*.—The type, 3.5 cm. long, was taken at Koh Tao, Gulf of Siam, September 24, 1928.

*Remarks*.—This striking little blenny, of which only one specimen is as yet known, was found in a coral head in shoal water on the west shore of Koh Tao. It swam with a sinuous, eel-like motion. A colored drawing from life has been made by Luang Masya Chitrakarn. The species resembles *E. ater*, but the bodily proportions are somewhat different, the head is deeper, the curvature of the snout is steeper, the snout is shorter, and the coloration of the side of head and of anal fin is markedly different. Of the many specimens of *E. ater* that have been collected in various parts of the Pacific and described under various names, none have shown the conspicuous black lines on the side of head and the brilliantly colored anal fin.

#### ***Salarias lineatus* Cuvier & Valenciennes.**

The Siamese Department of Fisheries has a single specimen, 8.2 cm. long, taking in a tide pool on Koh Chan, Gulf of Siam, July 25, 1926. It agrees with the published descriptions, showing the characteristic series of parallel dark lines on the sides, but the



dorsal rays are only XII,19 (as against XII,21-23 given by Day<sup>1</sup>, XII,23 by Fowler<sup>2</sup>, and XII,24 by Jordan & Seale<sup>3</sup>, and the anal rays are only II,20 (as against II,24 given by Fowler).

***Salarias periophthalmus* Cuvier & Valenciennes.**

As yet this species in Siam is known only from Koh Chan, a limestone, bird-nest island on the west side of the Gulf of Siam north of Chumporn, where two specimens 6.5 and 7.2 cm. long were taken in a tide pool on July 15, 1926, in company with *Salarias dussumieri*. These examples were kindly compared by Mr. Henry W. Fowler with specimens in the Academy of Natural Sciences of Philadelphia and thus identified by him. The species has a wide range in the tropical Pacific and Indian oceans.

***Salarias dussumieri* Cuvier & Valenciennes.**

This is the commonest blenny in Siamese waters. It has been collected in tide pools at Koh Kut, Koh Chula, Lem Sing, and Chantabun Estuary, in southeastern Siam; Koh Maprao and Koh Chan, off the east coast of Peninsular Siam; Koh Pipedon, off the west coast of Peninsular Siam; and may be looked for on almost every rocky island and rocky shore. The collection of the Siamese Department of Fisheries contains 30 specimens, the largest 8.7 cm. long. The very wide distribution of this species may be seen from the fact that it is recorded from India, Red Sea, South Africa, Australia, Melanesia, and Polynesia. The statement by Fowler (Fishes of Oceania) that in this species there is "no tentacle above eye" seems to be a slip. Day (Fishes of India) gives "a fringed tentacle above the orbit", and specimens from Siam identified by Fowler show a supraorbital tentacle.

***Salarias siamensis*, new species.**

*Description*.—Body elongate, strongly compressed, dorsal and ventral profiles nearly straight, depth at origin of dorsal fin 5.75 in

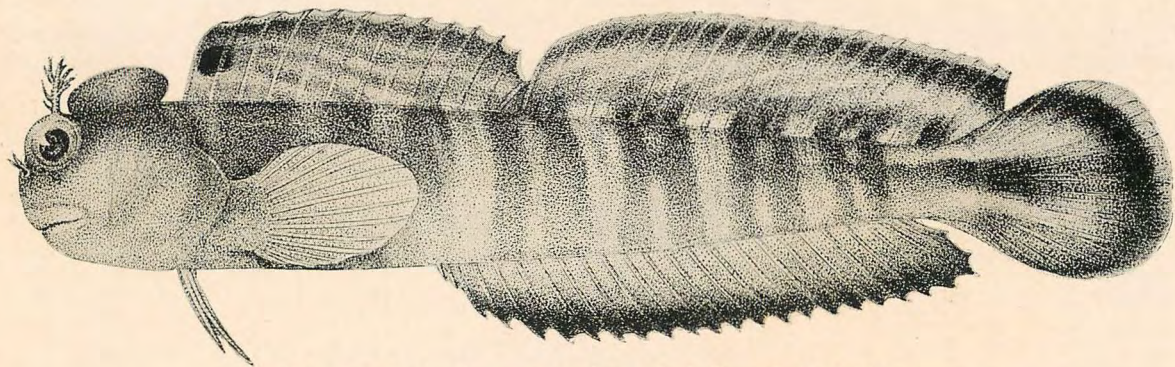
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<sup>1</sup> Fishes of India.

<sup>2</sup> Fishes of Oceania.

<sup>3</sup> Fishes of Samoa.





*Salaria siamensis*, new species. Koh Tao, Gulf of Siam.

From a drawing by Luang Masya Chitrakarn.





standard length, least depth of caudal peduncle 2 in head; head scarcely compressed, its width about equal to its depth, its length 4.6 in standard length, anterior profile of head nearly vertical; snout broad and obtuse; mouth very wide, its width equal to postorbital part of head, maxillary extending beyond vertical from posterior edge of eye, lips entire, minute teeth in an even row in each jaw, no canines; eye projecting beyond profile of head, 4.5 in head; interorbital space concave, less than eye; a multifid supraorbital tentacle longer than eye, a bifid tentacle less than .5 eye above anterior nostril; a long median cutaneous occipital crest twice diameter of eye, its height less than eye; no nuchal filaments; lateral line arched, discontinued over end of depressed pectoral.

Fins: Dorsal rays XIII, 21, the fins separated by a deep notch; spinous dorsal begins well forward, over base of ventrals, first spine more than .5 depth of body; second dorsal higher than first, joined by membrane to basal fourth of caudal; caudal rounded, its central rays less than head; anal rays II, 23, longest rays exceeding those of first dorsal, origin of fin under tenth dorsal spine, anal membranes incised; ventrals about .5 head; pectorals less than head, extending to vent.

Coloration: Entire body and head light brown, body marked by 6 broad, double dark brown cross-bands, head dark brown above; dorsal fins with dark brown submarginal band; first dorsal with 4 wavy, oblique, longitudinal dark brown lines, a round black spot occupying middle of first membrane; second dark with ill-defined oblique dark brown lines, its base dark brown, with 4 evenly-spaced light spots; caudal dark brown, its upper posterior edge and a central area light; anal with its distal half blackish-brown; ventrals and pectorals light brown.

*Type*.—The type, 7.2 cm. long, was taken in a tide pool on Koh Tao, Gulf of Siam, January 3, 1927. The specimen is obviously a male.

*Remarks*.—The characters on which this species is based do not harmonize with any of the numerous species of *Salarias* described from India, the East Indies, and various Pacific islands. The outstanding features are the long, multibranched supraorbital tenta-

cle, the long median cephalic flap, the absence of canine teeth, the advanced origin of the dorsal fin, the union of the second dorsal fin with the caudal, and the round black spot on the first dorsal membrane.

*Cirripectes indrambaryae*, new species.

*Description*.—Body moderately elongate, compressed, deepest under anterior dorsal rays, 3.5 in standard length, depth of caudal peduncle 2.25 in head; head compressed above, swollen below, its length slightly less than its depth and 3.4 in standard length; snout about 3 in head, its profile very steep, muzzle slightly projecting; mouth wide, lower jaw shorter, posterior angle of gape under anterior edge of pupil, lips inconspicuously fringed, no canine teeth; eye projecting beyond dorsal profile, less than 3 in head; interorbital space concave, more than 3 in eye; a trifold supraorbital filament shorter than eye; anterior nostril with a pentafiled tentacle .6 eye; a transverse nuchal fold surmounted by a row of cirri which are longest on sides; lateral line well developed, strongly arched anteriorly, discontinued over anterior third of anal fin.

Fins: Dorsal rays XII, 15, origin of fin anterior to upper base of pectorals, first spine 1.4 in head, last spine less than .5 length of first; first dorsal fin joined to second dorsal by a membrane one-third length of first soft dorsal ray which is over .8 length of first spinous ray, middle rays of second dorsal longest and equal to first spinous ray; second dorsal joined by membrane to base of upper caudal rays; caudal as long as head, rounded; anal not joined to caudal, the rays, II, 14, shorter than dorsal rays, the membranes deeply incised; ventrals 1.5 in head, extending more than .5 distance to anal; pectorals broad-based, central rays longest and 1.25 in head.

Coloration (life): Entire body and head nearly uniform dark sepia, becoming dull yellowish along base of anal and caudal; dorsals pale pinkish and yellowish, the rays red; caudal mostly pale orange, central part pale green, two quadrate reddish brown spots at base; anal dull greenish, basal part posteriorly yellow; ventrals dark brown; pectorals pale greenish above, pale orange below; supraorbital and nasal flaps and nuchal cirri brown.



*Type*.—The type and only known specimen, 5.0 cm. long, was collected in a tide-pool on Koh Samui, Gulf of Siam, August 6, 1931, by Nai Boon Chuay Indrambarya of the Siamese Department of Fisheries, after whom it is named.

***Xiphasia setifer* Swainson.**

The claims of this species to a place in the fauna of Siam rest on the unmistakable identification by the writer of a fish in a small, shallow tide-pool on Koh Chan, on the west side of the Gulf of Siam, on July 15, 1926. The fish was about 20 cm. long, and was easily recognized by its eel-like shape, the origin of dorsal fin over the eyes, the long, filamentous projection from the middle of the caudal fin, and the yellowish-brown coloration. Several blennies of the genus *Salarias* were in the same pool.

This species is known from India, the west coast of Africa, and the Philippines. By some ichthyologists it is made the type of a separate family, Xiphasiidae. Day (*Fishes of India*) ascribes to this fish the incredible length of 14 feet, a statement which is repeated in the *Fauna of British India, Fishes*, Vol. II; apparently 14 inches was intended, although a length of over half a meter has been recorded for the Philippines.

XIX. NEW AND RARE FISH RECORDS FROM SIAM.

***Rasbora heteromorpha* Duncker.** This beautiful little species, which is deservedly receiving increased attention on the part of aquarists, has heretofore been recorded for Siam only from the inner arm of the Tale Sap, or Inland Sea (Hora, "Fish of the Tale Sap, Peninsular Siam", 1924). The previously ascribed habitat was East Sumatra and Malacca (Malay Peninsula). It is now possible to assign a new locality in Siam, namely, Kao Sabap, an isolated mountain in Southeast Siam near Chantabun. The fish is common in a mountain stream up to 2,000 feet, and has been collected on three different occasions, July 12, 1928, January 12, 1929, and April 18, 1930. A specimen from the first lot is a male 30 mm. long with nuptial tubercles on head, especially well developed on the muzzle.

Another one of the same lot now in the British Museum was kindly compared by Mr. J. R. Norman with two of Duncker's types from Malacca and found to agree.

**Ophicephalus marulius** Hamilton. This is the rarest of the numerous species of serpent-head fishes found in Siam. It was listed from "Siam" by Karoli in 1882.<sup>1</sup> Karoli's Siamese records are not always trustworthy although in this case the record may be correct. There appears to be no other citation for Siam. In May, 1925, numerous small specimens were taken at Pakjong, Eastern Siam, in a tributary of the Mun River. The Department of Fisheries contains a specimen 27 cm. long obtained alive from Tonburi (Bangkok) on October 27, 1933. A fish about 40 cm. long was exhibited alive at a fair in Bangkok in December, 1933, and was examined by the writer on December 14; it was said to have come from Kanburi, on the Meklong in west-central Siam. In the Bangkok region the fish is called *pla chon ngu hao* (ngu hao=cobra) and its bite is reputed to be very poisonous, which belief is of course without any foundation. The species ranges from India to China and in India attains a length of four feet.

**Macrotrema caligans** (Cantor). This is a primitive eel-like fish, lacking pectoral and ventral fins and with the dorsal and anal fins represented by low, rayless folds confined to the last eighth of the body and confluent with the short caudal fin. It has heretofore been recorded from the sea at Penang and Singapore, from the Gulf of Siam at Singora, and from the Tale Sap at Pak Payun, and appears to be a rare form represented in but few museums. Recently Dr. Hardenberg has reported the fish from the north coast of Java<sup>2</sup>. A specimen 17 cm. long was taken by me from a pongpang net in the lower Bangpakong River, Central Siam, on June 25, 1933, in water which was quite fresh and very muddy. Cantor's type was 16.6 cm. long, and the maximum size known to be attained is 20 cm. In life the general body color was pinkish-purple, with the fins carmine.

<sup>1</sup> Prodromus piscium Asiae orientalis.

<sup>2</sup> Treubia, vol. XIV, part 2, December, 1933.



The caudal fin has been described as having 10 rays; Bleeker's figure<sup>1</sup>, copied from Cantor, shows 9; while the specimen now in hand has 15.

**Ophiocara porocephala** (Cuvier & Valenciennes). While this goby is of wide distribution in the Indian and Pacific Oceans, there is no published record of its occurrence in Siam. The collection of the Department of Fisheries has specimens, 14 to 21 cm. long, from Pattani, Singora, Koh Chang, Paknam Wain, and Chantabun Estuary. The names borne by the fish among Siamese fishermen are *pla bu hua man*, *pla makeur*, and *pla chon nam kem*, the last being quite apt, as the superficial resemblance to the serpent-head fishes is marked.

**Zonogobius semidoliatus** (Cuvier & Valenciennes). The wide range of this goby, from the Red Sea through the Indo-Australian Archipelago to the Philippines, Samoa, Tonga, etc., embraces Siam; but whereas in other waters the fish is found on coral reefs, the only known occurrence of the fish in local waters was in a littoral tide-pool at Lem Sing, Southeast Siam, on April 5, 1930, when four specimens 14 to 21 mm. long were taken.

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<sup>1</sup> Atlas Ichthyologique.